ECE 530 Cloud Computing

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Virtualization and Virtual Machines

APPLICATIONS

OPERATING SYSTEM

HARDWARE

TRADITIONAL ARCHITECTURE

APP   APP   APP
OS   OS   OS

VIRTUALIZATION LAYER

HARDWARE

VIRTUAL ARCHITECTURE
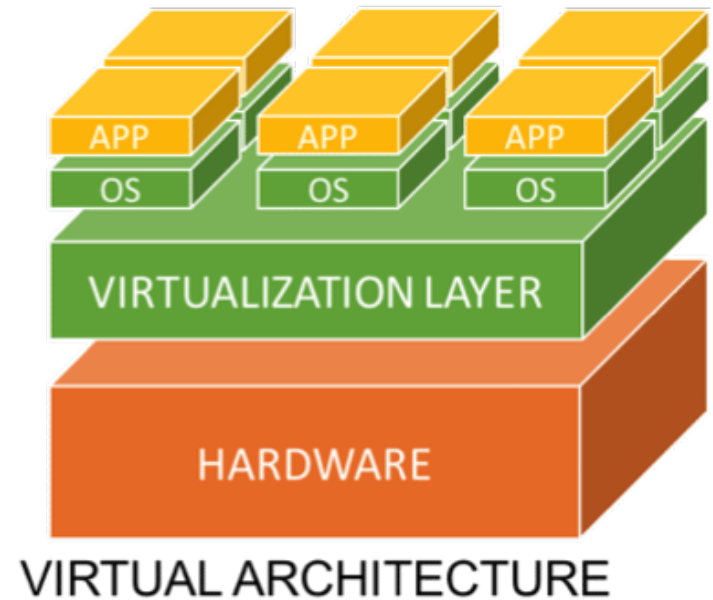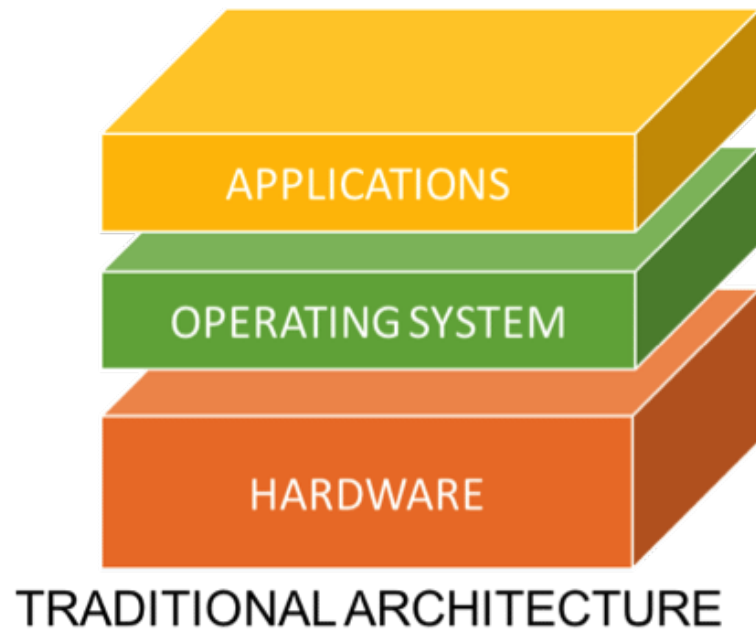
Virtualization

You can't physically touch the cloud server machines. Hardware can and frequently will change.

To avoid dependency on specific hardware, you generally write your server program to run on virtual machines.

Virtualization Diagram

Cloud Stack

Cloud Applications

Cloud Services

Operating System

Virtual Machine Manager

Hardware
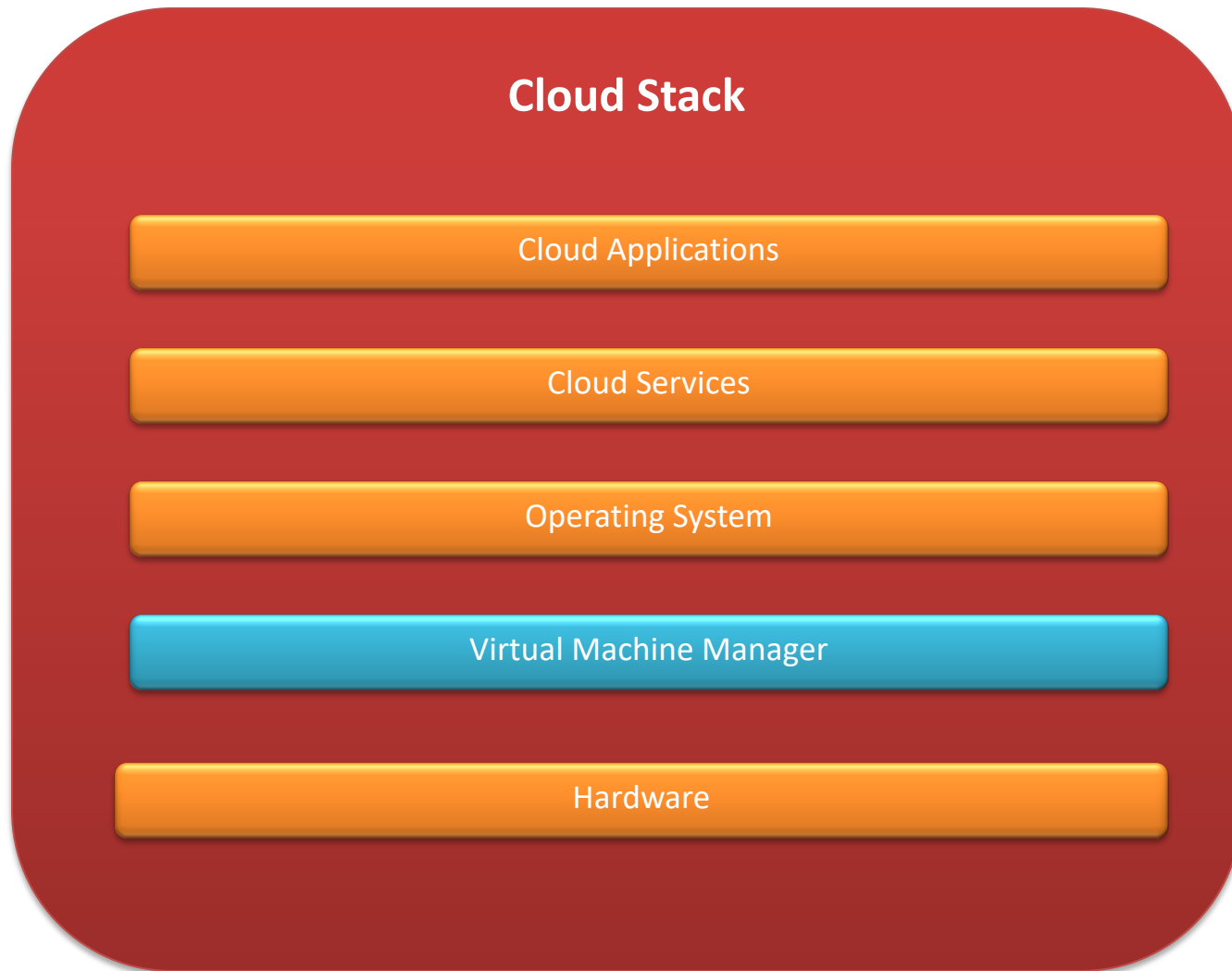
Virtualization

- Virtual workspaces:
  - An abstraction of an execution environment that can be made dynamically available to authorized clients by using well-defined protocols,
  - Resource quota (e.g. CPU, memory share),
  - Software configuration (e.g. O/S, provided services).
- Implement on Virtual Machines (VMs):
  - Abstraction of a physical host machine,
  - Hypervisor intercepts and emulates instructions from VMs, and allows management of VMs,
  - VMWare, Xen, etc.
- Provide infrastructure API:
  - Plug-ins to hardware/support structures

App	App	App
OS	OS	OS
Hypervisor		
Hardware		
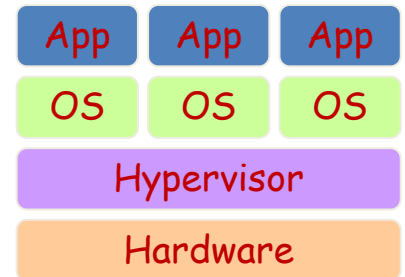
Virtualized Stack

Virtual Machines

- VM technology allows multiple virtual machines to run on a single physical machine.
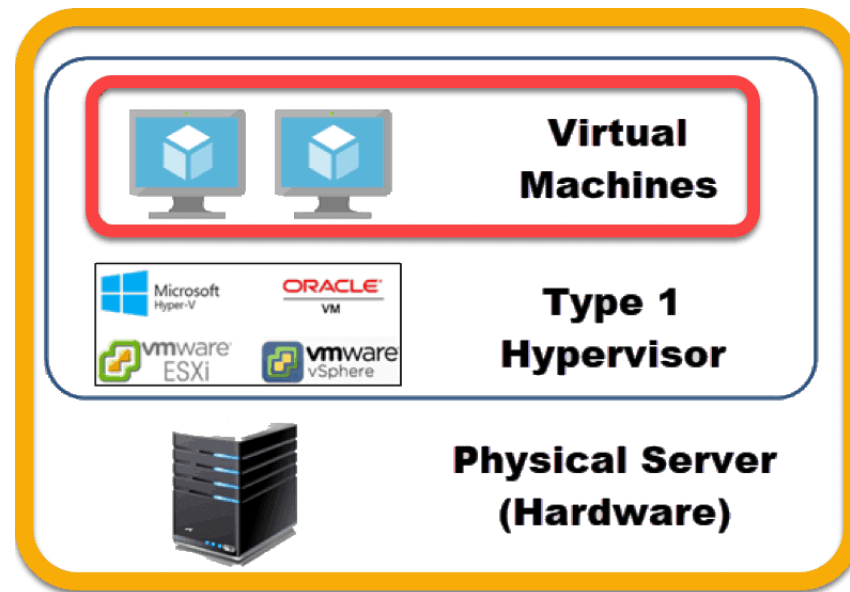
Performance: Para-virtualization (e.g. Xen) is very close to raw physical performance!